

CLAIMS

What is claimed is:

- 5 1. A method for adjusting usage of a resource of a communications channel, the method comprising the steps of:
- negotiating a current resource setting for usage of the resource of the communications channel;
- performing communications on the communications channel using the resource;
- 10 and
- periodically renegotiating a new value for the current resource setting upon detecting a negotiation event during performance of communications on the communications channel using the resource.
- 15 2. The method of claim 1 wherein the negotiation event indicates that an accrued usage cost of the resource of the communications channel is at least one of
- i) substantially equals to a cost to renegotiate the current resource setting; and
- ii) exceeds a cost to renegotiate the current resource setting.
- 20 3. The method of claim 1 wherein the negotiation event indicates at least one of:
- i) that an actual resource setting of the communications channel substantially equals the current resource setting for the communications channel;
- ii) that an actual resource setting of the communications channel substantially exceeds the current resource setting for the communications channel.
- 25 4. The method of claim 1 wherein the resource is a bandwidth setting of the communications channel and wherein the negotiation event indicates that a data communications device using the bandwidth setting of the communications channel has requested to negotiate a new value for the current resource setting for the bandwidth
- 30 setting of the communications channel.

5. The method of claim 1 wherein the step of periodically renegotiating a new value for the current resource setting upon detecting a negotiation event comprises the steps of:

detecting a negotiation event related to the resource;

5 in response to the step of detecting, calculating a new value for the current resource setting that more closely approximates a value of an actual resource usage of the resource of the communications channel; and

negotiating with a resource allocator to establish the new value for the current resource setting.

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6. The method claim 5 wherein if a value of the actual resource usage setting is lower than a former value of the actual resource usage setting, the new value of the current resource setting is calculated to be lower than a former value of the current resource setting.

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7. The method claim 5 wherein if a value of the actual resource usage setting is higher than a former value of the actual resource usage setting, the new value of the current resource setting is calculated to be at least one of:

i) higher than a new value of the actual resource usage setting; and

20 ii) substantially equal to the new value of the actual resource usage setting.

8. The method of claim 5 wherein the step of calculating a new value for the current resource setting comprises the steps of:

calculating a new value for a minimum resource setting;

25 calculating a new value for a maximum resource setting;

calculating the new value for the current resource setting to be a new value approximately between the value for the minimum resource setting and the value for the maximum resource setting.

9. The method of claim 8 wherein the step of calculating the new value for the current resource setting comprises the steps of:

calculating a summation value to be the sum of the new value for the maximum resource setting and the new value for the minimum resource setting;

5 calculating the new value for the current resource setting to be the summation value divided by two; and

setting a value of the peak resource usage to be a current value of the actual resource usage.

10 10. The method of claim 9 wherein:

the step of calculating a new value for a minimum resource setting calculates the new value of the minimum resource setting to be a maximum of a peak resource usage and a current value of the minimum resource setting; and

15 the step of calculating a new value for a maximum resource setting sets the new value of the maximum resource setting to be the value of the current resource setting.

11. The method of claim 10 wherein the negotiation event indicates that an accrued usage cost of the resource of the communications channel is at least one of

i) substantially equals to a cost to renegotiate the current resource setting; and

20 ii) exceeds a cost to renegotiate the current resource setting.

12. The method of claim 9 wherein:

the step of calculating a new value for a minimum resource setting sets the new value of the minimum resource setting to be the value of the current resource setting; and

25 the step of calculating a new value for a maximum resource setting calculates the new value of the maximum resource setting to be a maximum of a maximum resource setting and a current value of the actual resource usage setting.

13. The method of claim 12 wherein the negotiation event indicates at least one of:

- i) that an actual resource setting of the communications channel substantially equals the current resource setting for the communications channel; and
- ii) that an actual resource setting of the communications channel substantially exceeds the current resource setting for the communications channel.

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14. The method of claim 8 further including the step of:

setting the maximum resource setting to a value of an upper limit of the current resource setting and setting the minimum resource setting to a value of the actual resource usage setting if, during the performance of communications on the communications channel using the resource, the maximum resource setting substantially equals the minimum resource setting.

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15. The method of claim 8 wherein the step of negotiating a current resource setting for usage of the resource of the communications channel comprises the steps of:

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initializing the new value for the minimum resource setting, the new value for the current resource setting, and a value for a peak resource usage to be a current value of the actual resource usage of the resource of the communications channel;

initializing the new value for a maximum resource setting to be a value of an upper limit of the current resource setting of the resource of the communications channel; and

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negotiating with a resource allocator to establish the new value for the current resource setting.

16. A communications device comprising:

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an communications interface;  
a memory system;  
a processor; and  
an interconnection mechanism coupling the communications interface, the memory system, and the processor;

wherein the memory system is configured with a resource negotiation application, that when performed on the processor, provides a resource negotiation process to adjust usage of a resource of a communications channel by performing the operations of:

- 5 negotiating a current resource setting for usage of the resource of the communications channel;
- performing communications on the communications channel using the resource;
- and
- periodically renegotiating a new value for the current resource setting upon
- 10 detecting a negotiation event during performance of communications on the communications channel using the resource.

17. The communications device of claim 16 wherein the negotiation event indicates that an accrued usage cost of the resource of the communications channel is at least one of

- 15 i) substantially equals to a cost to renegotiate the current resource setting; and
- ii) exceeds a cost to renegotiate the current resource setting.

18. The communications device of claim 16 wherein the negotiation event indicates at least one of:

- 20 i) that an actual resource setting of the communications channel substantially equals the current resource setting for the communications channel; and
- ii) that an actual resource setting of the communications channel substantially exceeds the current resource setting for the communications channel.

25 19. The communications device of claim 16 wherein the resource is a bandwidth setting of the communications channel and wherein the negotiation event indicates that a data communications device using the bandwidth setting of the communications channel has requested to negotiate a new value for the current resource setting for the bandwidth setting of the communications channel.

20. The communications device of claim 16 wherein when the resource negotiator process performs the operation of periodically renegotiating a new value for the current resource setting upon detecting a negotiation event, the resource negotiation process performs the operations of:

5           detecting a negotiation event related to the resource;  
          in response to the step of detecting, calculating a new value for the current resource setting that more closely approximates a value of an actual resource usage of the resource of the communications channel; and  
          negotiating with a resource allocator to establish the new value for the current  
10   resource setting.

21. The communications device claim 20 wherein if a value of the actual resource usage setting is lower than a former value of the actual resource usage setting, the new value of the current resource setting is calculated to be lower than a former value of the current  
15   resource setting.

22. The method claim 20 wherein if a value of the actual resource usage setting is higher than a former value of the actual resource usage setting, the new value of the current resource setting is calculated to be at least one of:

- 20           i) higher than a new value of the actual resource usage setting; and  
          ii) substantially equal to the new value of the actual resource usage setting.

23. The communications device of claim 20 wherein when the resource negotiator process performs the operation of calculating a new value for the current resource setting,  
25   the resource negotiator process performs the operations of:

          calculating a new value for a minimum resource setting;  
          calculating a new value for a maximum resource setting;  
          calculating the new value for the current resource setting to be a new value approximately between the value for the minimum resource setting and the value for the  
30   maximum resource setting.

24. The communications device of claim 23 wherein when the resource negotiator process performs the operation of calculating the new value for the current resource setting, the resource negotiator process performs the operations of:

5       calculating a summation value to be the sum of the new value for the maximum resource setting and the new value for the minimum resource setting;

          calculating the new value for the current resource setting to be the summation value divided by two; and

10       setting a value of the peak resource usage to be a current value of the actual resource usage.

25. The communications device of claim 24 wherein:

15       the operation of calculating a new value for a minimum resource setting calculates the new value of the minimum resource setting to be a maximum of a peak resource usage and a current value of the minimum resource setting; and

          the operation of calculating a new value for a maximum resource setting sets the new value of the maximum resource setting to be the value of the current resource setting.

20   26. The communications device of claim 25 wherein the negotiation event indicates that an accrued usage cost of the resource of the communications channel is at least one of

          i) substantially equals to a cost to renegotiate the current resource setting; and

          ii) exceeds a cost to renegotiate the current resource setting.

25   27. The communications device of claim 25 wherein:

          the operation of calculating a new value for a minimum resource setting sets the new value of the minimum resource setting to be the value of the current resource setting; and

the operation of calculating a new value for a maximum resource setting calculates the new value of the maximum resource setting to be a maximum of a maximum resource setting and a current value of the actual resource usage setting.

5 28. The communications device of claim 27 wherein the negotiation event indicates at least one of:

i) that an actual resource setting of the communications channel substantially equals the current resource setting for the communications channel; and

10 ii) that an actual resource setting of the communications channel substantially exceeds the current resource setting for the communications channel.

29. The communications device of claim 23 wherein the resource negotiator process further performs the operations of:

15 setting the maximum resource setting to a value of an upper limit of the current resource setting and setting the minimum resource setting to a value of the actual resource usage setting if, during the performance of communications on the communications channel using the resource, the maximum resource setting substantially equals the minimum resource setting.

20 30. The communications device of claim 23 wherein when the resource negotiator process performs the operation of negotiating a current resource setting for usage of the resource of the communications channel, the resource negotiator process performs the operations of:

25 initializing the new value for the minimum resource setting, the new value for the current resource setting, and a value for a peak resource usage to be a current value of the actual resource usage of the resource of the communications channel;

initializing the new value for a maximum resource setting to be a value of an upper limit of the current resource setting of the resource of the communications channel; and



negotiating with a resource allocator to establish the new value for the current resource setting.

31. A computer program product having a computer-readable medium including resource negotiation application computer program logic encoded thereon for adjusting usage of a resource of a communications channel, such that the computer program logic, when performed on at least one processor within a communications device, causes the at least one processor to perform the operations of:

negotiating a current resource setting for usage of the resource of the communications channel;

performing communications on the communications channel using the resource; and

periodically renegotiating a new value for the current resource setting upon detecting a negotiation event during performance of communications on the communications channel using the resource.

32. The computer program product of claim 31 wherein the computer program logic is capable of detecting a negotiation event that indicates that an accrued usage cost of the resource of the communications channel is at least one of

- i) substantially equals to a cost to renegotiate the current resource setting; and
- ii) exceeds a cost to renegotiate the current resource setting.

33. The computer program product of claim 31 wherein the computer program logic is capable of detecting a negotiation event that indicates at least one of:

- i) that an actual resource setting of the communications channel substantially equals the current resource setting for the communications channel; and
- ii) that an actual resource setting of the communications channel substantially exceeds the current resource setting for the communications channel.

34. The computer program product of claim 31 wherein the resource is a bandwidth setting of the communications channel and wherein the computer program logic is capable of detecting a negotiation event that indicates that a data communications device using the bandwidth setting of the communications channel has requested to negotiate a new value for the current resource setting for the bandwidth setting of the communications channel.

35. The computer program product of claim 31 wherein the computer program logic that causes the processor to perform the operation of periodically renegotiating a new value for the current resource setting upon detecting a negotiation event, further causes the processor to perform the operations of:

- detecting a negotiation event related to the resource;
- in response to the step of detecting, calculating a new value for the current resource setting that more closely approximates a value of an actual resource usage of the resource of the communications channel; and
- negotiating with a resource allocator to establish the new value for the current resource setting.

36. The computer program product of claim 35 wherein the computer program logic that causes the processor to perform the operation of calculating a new value for the current resource setting, further causes the processor to perform the operations of:

- calculating a new value for a minimum resource setting;
- calculating a new value for a maximum resource setting;
- calculating the new value for the current resource setting to be a new value approximately between the value for the minimum resource setting and the value for the maximum resource setting.

37. A communications device comprising:

- an communications interface;
- a memory system;
- a processor; and

an interconnection mechanism coupling the communications interface, the memory system, and the processor;

wherein the memory system is configured with a resource negotiation application, that when performed on the processor, provides the communications device

5 with a means for adjusting usage of a resource of a communications channel, including:

means for negotiating a current resource setting for usage of the resource of the communications channel;

means for performing communications on the communications channel using the resource; and

10 means for periodically renegotiating a new value for the current resource setting upon detecting a negotiation event during performance of communications on the communications channel using the resource.